

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Stream Crossing

(No.)

Code 578

DEFINITION

A trail or travel way constructed across a stream to allow livestock, equipment, or vehicles to cross with minimal disturbance to the stream ecosystem.

PURPOSES

- Prevent or minimize water degradation from sediment, nutrient, and organic loading.
- Protect the watercourse from degradation and adverse hydrological impacts.
- Reduce streambank and streambed erosion by providing a stable area to cross.
- Provide a means for animals, equipment, or vehicles to cross a watercourse.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where an intermittent or perennial watercourse exists and a ford or culvert type crossing must be made for livestock, people, and /or equipment.

CRITERIA

Planned work shall comply with all federal, state and local laws and regulations.

All areas to be vegetated shall be established to grass as soon as practical after construction. All disturbed areas shall be vegetated according to

practice Field Office Technical Guide (FOTG) Standard Critical Area Planting (342).

Stream crossings shall be located in areas where the streambed is stable. Avoid sites where channel grade or alignment changes abruptly, instability is evident, overfalls exist, or large tributaries enter the stream. Wetland areas shall be avoided if at all possible. If impact to wetlands cannot be avoided, follow Natural Resources Conservation Service (NRCS) wetland policy and procedures and Corps of Engineers requirements.

Crossings shall be installed perpendicular to the direction of flow of the stream. Skews should be avoided on all but the smallest streams.

Multi-use stream crossing shall be a minimum of 10 feet and a maximum of 20 feet wide in the upstream-downstream direction. "Livestock only" crossings may be as narrow as 6 feet wide. Width is defined as the crossing surface and does not include the side slopes.

All cuts and fills for the stream crossing shall have side slopes that are stable for the soil or soil material involved. Side slopes of earth fills shall be no steeper than 2.5 horizontal (H) to 1 vertical (V). Rock fills shall be no steeper than 1.5 (H) to 1 (V). Cut slopes shall be no steeper than 2.0 (H) to 1 (V).

Entrance and exit approaches to the stream crossing shall blend with existing site conditions where possible, but shall not be steeper than 5 (H) to 1 (V). The entrance and exit approach shall be stable for the expected use. The same surfacing provided for the bottom may be

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needed. The minimum width of the approaches shall be equal to the width of the structure.

Surface runoff shall be diverted around the entrance and exit travel way to prevent runoff from entering the stream. Roadside ditches shall be directed into the diversion or away from the crossing surface.

The stone shall be dense and hard enough to withstand exposure to air, water, freezing and thawing and sized according to site conditions.

Cutoff walls are needed at the beginning and end of stream crossings to protect against undercutting. The cutoff wall should extend into stable material.

Fencing is not necessary at all sites. Stream channel areas above and below the stream crossing shall be permanently fenced (or otherwise excluded) if needed to prevent livestock access to the stream except at the crossing. Fencing shall be built to meet FOTG Conservation Practice Standard 382.

Ford crossings with free access by cattle shall have limbs pruned near the ford to minimize shade and thereby reduce cattle loafing time in the stream.

Culvert Crossings

The structure shall be large enough to convey the flow without appreciably altering the stream flow characteristics. The pipe shall be sized to handle the bank full flow or the peak runoff from the 2-year, 24-hour peak discharge whichever is less. The culvert shall be adequately protected so that out-of-bank flows safely bypass without culvert or stream bank damage.

The length of the culvert shall be adequate to extend the full width of the crossing, including side slopes. The culvert pipe shall be placed on-grade with the existing stream bottom.

Acceptable culvert materials include concrete, corrugated metal, corrugated plastic, and new or used high quality steel. The engineer may deem other materials appropriate.

Compacted fill will be used to form the crossing. The minimum depth of compacted fill over the culvert shall be equal to one-half the diameter of the culvert, or 24 inches, whichever is greater. The compacted fill shall be built up over the

culvert so that any stream overflow will cross the road at a point away from the culvert. 2

Ford Type Crossings

When fords are used, size the crossing so that the cross sectional area of the crossing is equal to or exceed the natural cross sectional area. The bottom of the ford shall have a width equal to the bottom width of the channel, but not less than 4 feet. Provide a low flow channel in the bottom of the ford 4 inches below stream channel bottom.

The finished top surface of the ford stream crossing in the bottom of the watercourse shall be no higher than the original stream bottom on both the upstream and downstream edges of the ford in order to eliminate any overfall and possible scour problems.

Fords Using Concrete

Concrete fords shall not be used unless the foundation of the stream crossing is determined to have adequate bearing strength and a stable grade.

Concrete fords shall have a minimum compressive strength of 3,000 psi at 28 days. Concrete fords shall consist of a minimum thickness of concrete of 5 inches with minimum reinforcement of 6-inch by 6-inch, 6 gage woven wire fabric. Place 4 inches of gravel as the base for the 5-inch thick concrete slab.

Fords Using Geotextile and Stone

Gravel fords with geotextile shall be used when the site has a soft or unstable subgrade. Geotextile fabric material shall be installed on the excavated surface of the ford according to the specifications contained in this standard. The fabric shall extend across the bottom of the stream and at least 20 feet up each approach section. All edges of the fabric shall be keyed into the subgrade a minimum of 12 inches.

The stream crossing must be designed to remain stable during either the bank full event or the peak runoff from a 10-year, 24-hour event, whichever is less.

Fords Using Geotextile, Geocell, and Stone

Geocell material shall have a minimum depth of 6 inches. The geocell material shall not be used if velocities are expected to exceed 5 fps.

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Geotextile shall be installed under the geocell material. Install the geocell in accordance with the manufacturer's recommendations.

The geotextile and geocell shall extend across the bottom and at least 20 feet up each approach section. Stone shall be used to fill the geocell. Geocell will be overfilled with stone a minimum of 2 inches. Use staples, clips, anchor pins or earth anchors as required by manufacturer.

CONSIDERATIONS

Avoid crossing streams when possible. Stream crossings can be a direct source of water pollution; they may create flooding and safety hazards; and they can be expensive to construct and maintain.

Rock crossing for livestock use may have a hoof contact zone over the surfacing stone or gravel. This zone could include ground limestone, rock screenings, crusher run, or similar materials. This layer is expected to be replaced periodically by the landowner as livestock traffic or runoff events erode the surface material. Coarse rock though, used in the crossing, will help to deter loafing time in the stream.

Fords made of stabilizing material such as rock riprap are often used in steep areas subject to flash flooding, where normal flow is shallow or intermittent. Fords have the least detrimental impact on water quality when crossing is infrequent. Fords are especially adapted for crossing wide, shallow watercourses with firm streambeds.

When using geocell in soft stream bottoms with heavy equipment crossing the ford, consider over excavating the stream bottom and installing geotextile and rock as a foundation for the geocell.

For heavily used areas, consider using a culvert instead of a ford. However, culverts are not recommended for large drainage areas. When a culvert is utilized, consider using riprap outlet protection since culverts concentrate flow and often create streambed scour.

Roads or trails leading to stream crossings will normally slope into the stream. Water diversions should be installed to move sediment-laden runoff from the trail or road and to disperse the runoff onto an undisturbed area for filtering. Stream crossings should provide a way for normal passage of water and aquatic animal within the channel.

Consideration should be given to erosion and sedimentation that will be caused by the installation of the crossing and any necessary stream diversion. Construction should be done during the driest part of the year.

PLANS AND SPECIFICATIONS

Plans and specifications for stream crossings shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan will be developed and carried out for the life of the practice.

The stream crossing should be inspected at least annually by the landowner or operator and stone replaced as needed. The stream crossing and associated fence should be inspected after each major storm event and repairs made as needed.

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